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Securing our Water Future  
Ensuring a Water Rich Massachusetts  
Presented to the  
Community Preservation Institute Alumni Class  
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Water issues have been in the news more than ever in recent months. The drought this past year helped to highlight the water supply problems that many cities and towns are facing.

Massachusetts is a relatively water rich state – we get on average 44 inches a year in precipitation – more than twice what a state like California gets (21 inches).

So what is the problem? Unplanned growth and rapid development have been putting new strains on our water supplies and our natural water resources.



Water is like our canary in the coal mine – it is giving us an early warning of impacts to our environment. We need to listen to its warning.

Highlighting early warning signals and helping communities understand what they mean is at the core of our Community Preservation Initiative at EOE. This class probably knows this better than anyone – as people who were motivated to complete our Community Preservation Institute you likely saw these issues in your own community and wanted to be better able to do something about it.

Let me explain how our Community Preservation Initiative has led to my current focus on water issues.

#### Buildouts

We started by developing buildouts for all 351 communities in the Commonwealth. The buildouts show the maximum development permissible under local zoning laws.

The 495 region shows how land use has changed over the last 30 years, and more importantly how it is will continue to change.

For these 43 communities the buildout shows that:

- In 1970 the population was 457,000

- 22% of the region was in developed land use, or about .25 acres per person
- 15,000 acres were in agricultural use
- In 1999, developed land use had increased almost 60% (181,000 acres, double the rate of population growth at about .44 acres per person
- 9,000 acres of farmland and 40,000 acres of forest were lost
- At buildout there will be 312,000 additional residents
- Total developed land almost doubles to 353,000 acres or 70% of the region
- This will mean about 46 million more gallons of water a day, on average, than the 63 million gallons a day the region uses today.

We completed buildouts for every community in the Commonwealth and presented the results to every board of Selectmen and City Council across the state.

Our mission was to help local leaders understand the direction their community was heading – by right, as determined by zoning.

The buildouts also allowed communities to see how growth in their region was affecting shared resources like open space and water. Part of the lesson of the buildouts is that if communities work in isolation, these shared resources are likely to be lost.

While the buildouts helped frame the question, we were also working to help communities develop solutions to the issues of community preservation, growth and environmental protection.

#### Massachusetts Watershed Initiative

Since 1998 we have undertaken a concerted effort to provide communities with the tools they need to protect watershed resources and proactively address the future of their communities.

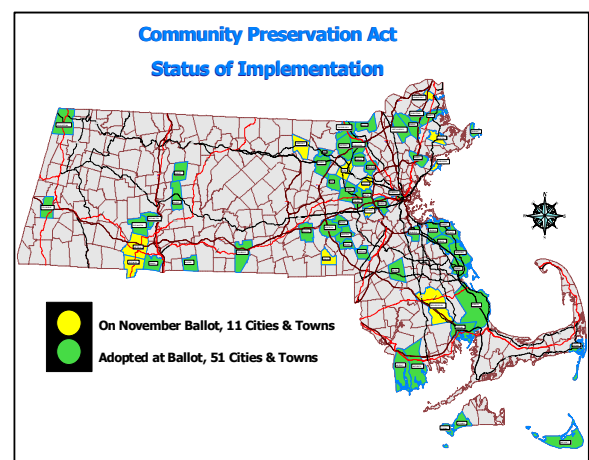
Through our Watershed Initiative our watershed team leaders have worked in all 27 watersheds across the state to establish a cooperative process through which communities and stakeholders can work together on watershed issues. The Initiative provides a forum through which these partners can participate in identifying priority problems and taking steps to address these problems. The Initiative has helped communities focus on water resource and environmental protection efforts of regional significance.

#### CPA

We were also able to make new funding available for open space protection, historic preservation and affordable housing by passing and signing into law the Community Preservation Act.

The CPA provides communities with the ability to raise funds for these purposes and provides matching grants from the state. These funds can be used for protection of water supplies and water resources.

So far 51 communities have taken advantage of the Act. Eleven more are scheduled to vote this November. This year \$42 million will have been made available for local efforts between the local funds and the associated state matching funds.

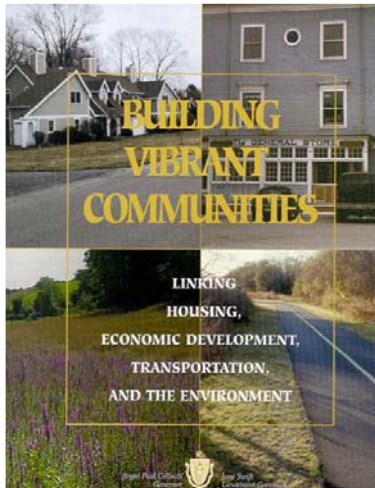


## EO 418

To help communities determine what lands they should be protecting and to address the issues of continuing growth Governor Jane Swift signed Executive Order 418.

Under 418, EOEA, the Department of Housing and Community Development and the Department of Transportation are providing planning assistance to communities to complete community development plans.

These plans provide the opportunity for communities to develop a comprehensive economic, housing, transportation and environmental plan for themselves.



The important first step in this process is to front-end the protection of environmental resources as the basis on which to make decisions about housing, economic development and transportation.

Identifying and protecting the ‘green infrastructure’ within the community is the key first step to protecting a sustainable environment and building a sustainable community.

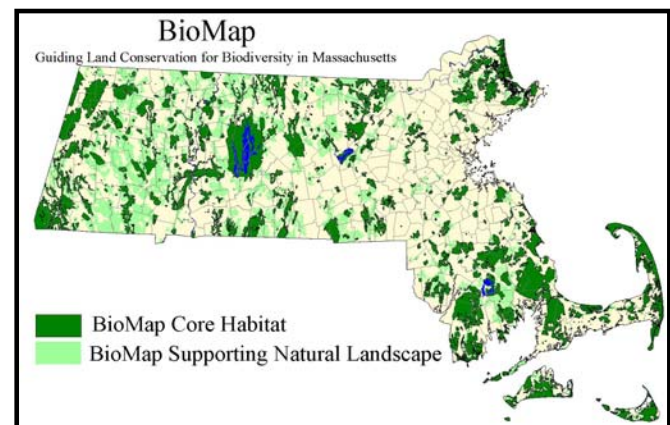
Green infrastructure includes the important environmental features of the community – the water resources and water supplies, the areas important for habitat and biodiversity, the open space and unique natural features. By identifying these areas first, the community can plan their future in a way that protects these valuable natural assets.

## BioMap

While supporting local efforts to identify and protect our green infrastructure we have also worked to define the larger, statewide network of natural resources that we must protect to maintain functioning ecosystems within the state.

Our key effort has been the development of the BioMap. The map identifies our biodiversity ‘hot spots’ – the most important areas to protect in order to preserve our biodiversity.

Part 1 is completed and covers terrestrial and wetland habitats.

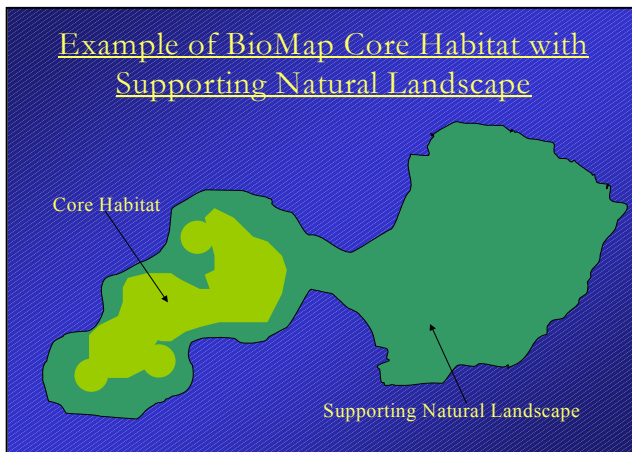


Part 2 is nearly complete and covers our freshwater aquatic habitats – rivers, streams, lakes and ponds.

These maps inform statewide conservation plans, watershed based open space plans, local community development plans and helped us decide on the location of our Bioreserves. They also show us areas where land protection can achieve multiple benefits, such as water supply protection and habitat preservation.

## Creating the BioMap

The BioMap is based on a comprehensive evaluation of 22 years of NHESP biological data



We worked to create a GIS map representing Massachusetts':

- Most viable **rare species** occurrences
- Most viable exemplary **natural community** occurrences
- Functional **landscapes** that provide buffers, connectivity
- And ecological processes and patterns that maintain biodiversity

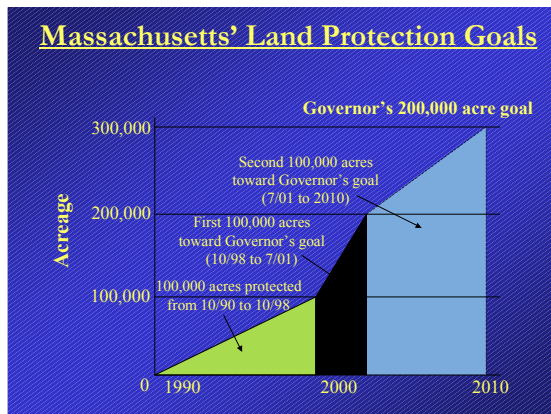
Add to this core the supporting natural landscape, which provides:

- Buffers around core habitats, connectivity
- between core habitats, large, undeveloped patches
- Ecological processes that maintain biodiversity
- Common species and communities undocumented rare species

### Land conservation

Our biodiversity mapping is helping to guide our land conservation. We are driven by the understanding that biodiversity and ecosystems are the ecological "support beams" of the natural resources on which we depend.

We have made great progress toward meeting the Governor's goal of preserving 200,000 acres of land by 2010. We are working to protect the second 100,000 acres well before 2010. We anticipate protecting 140,000 acres by this December.



It is interesting to note that over 70% of rare and endangered species in Massachusetts utilize land along our rivers and other water resources during some or all of their life cycle. In the past two years, we protected 44 miles along our rivers, 8 miles along lakes and ponds.

### Bioreserves

In the past two years, EOE land acquisition has protected areas rich in biodiversity. The protected areas include intact ecosystems, including two large Bioreserves. We are looking to establish a network of

five Bioreserves; two are in place -- Southeastern Massachusetts Bioreserve and the Massachusetts Military Reservation (MMR) -- and three are in progress (North Quabbin, Springfield, and Berkshires Plateau).

We created the first Bioreserve in Massachusetts, in the city of Fall River. The Southeastern Massachusetts Bioreserve protects a large ecosystem in a core area of 14,000 acres.

This Bioreserve is unique in that it is so close to a highly urbanized area.

The Southeastern Massachusetts Bioreserve is also unique in that a major piece of the Bioreserve protects the City of Fall River's drinking water supply.

With the completion of the Bioreserve, we have forever changed the buildout of the City of Fall River - now half of the City is conservation land and half of the City is developed. Their water supply also continues to be assured of permanent, long-term protection. This Bioreserve was the result of a partnership with The Trustees of Reservations, the oldest land trust in the U.S. and the City of Fall River.

### Aquifer land acquisition

We have also focused our state land protection dollars on working with communities to protect existing water resources.

We worked with the City of New Bedford to protect the Betty's Neck area of the Assowompsett pond in Lakeville. This water supply is critical to communities in southeastern Massachusetts as it provides over 20 million gallons of water a day to New Bedford, Taunton and Lakeville.

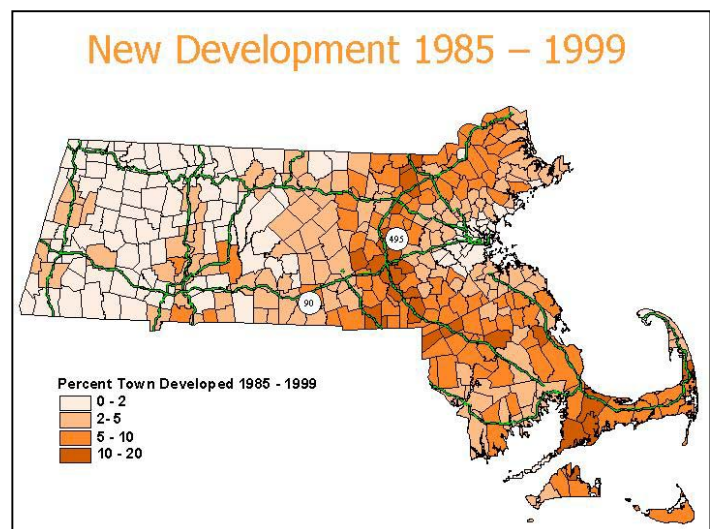
We also worked with the city of Springfield to protect land in the Cobble Mountain watershed.

In total we protected 7,000 acres through our aquifer land acquisition program last year.

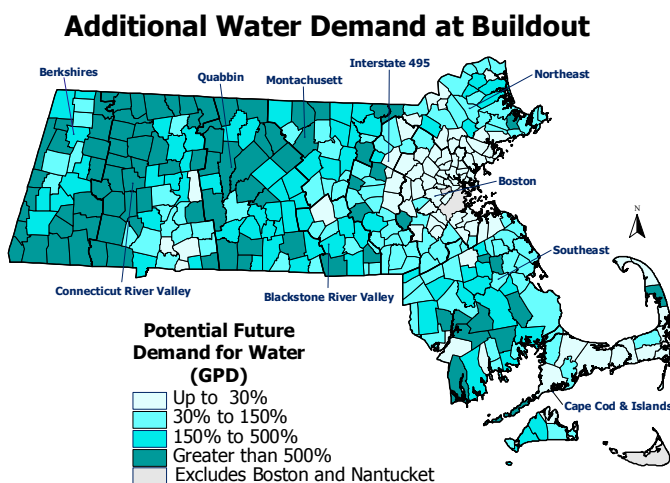
### Future water resource needs

So while we have already made progress toward protecting water supplies and water resources through our Community Preservation and land protection efforts, we realize we need to do even more. As you know, the buildouts depict the maximum development allowed under current zoning. Among the information this analysis provided was the ability to look at the water needs future for the Commonwealth. The buildouts allowed us to estimate the amount of water that might be needed by each of our communities in the future.

What it showed us is that we face a large potential water supply deficit – that the demands of the future are far larger than the



water supplies we have today.



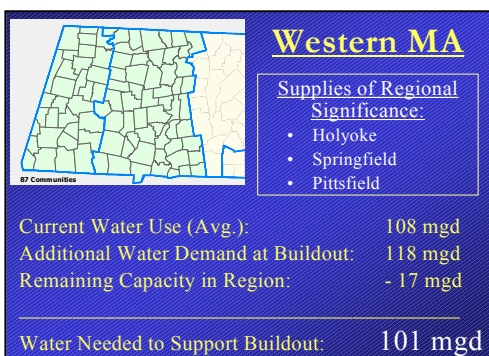
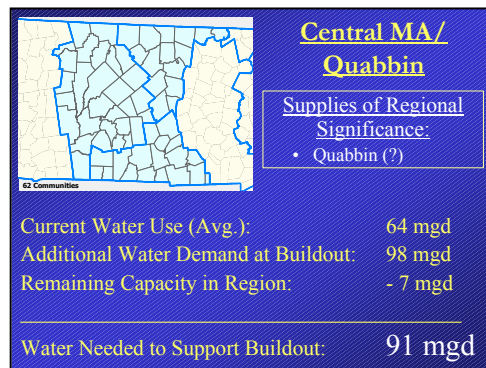
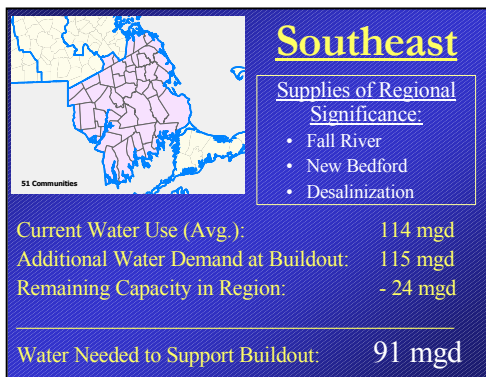
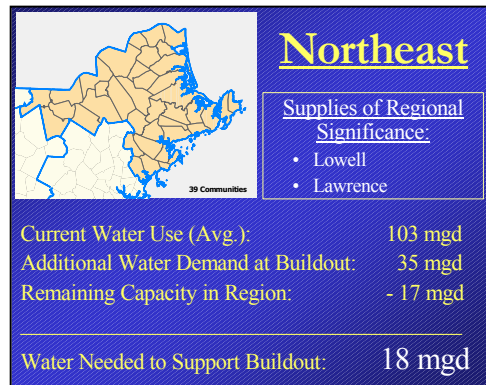
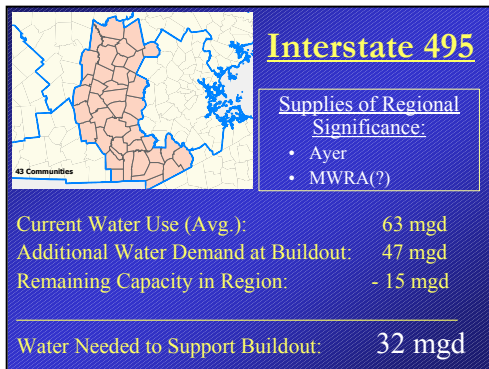
Statewide the buildouts estimate that we will need, on average, 440 millions gallons a day additional water. This is about 60% more water than the 740 million gallons as day we use today.

While there are some areas that currently have excess capacity in their water system, our best estimate is that the gap between what we have and what might need is about 320 million gallons per day. But this is a very rough number that really just gives us a sense of the magnitude of the issue.

Where does this 320 million gallons per day deficit come from?

Lets look at the 495 region again. Currently these 43 communities use about 63 mgd. At buildout we estimate they may need about 47 million additional gallons per day on an average day. There may be about 15 million gallons of existing unused capacity in the region, so the possible deficit is 32 million gallons a day, on average.

Across the Commonwealth we see a similar story:



So our challenge for the future is significant.

#### Hurdles to meeting future demands

But the issue is not as simple as just finding 320 mgd in new water supplies.

#### Existing environmental impacts

Across the state there are many water supplies that were built long before current environmental protection laws were put in place. Some of these withdrawals are having significant impacts to the environment.

One example in the 495 region is Kingsbury Pond in Norfolk. This pond used to be about 26 acres in size. But for over 35 years the pond has been about 10 acres of size – reduced by a nearby well in the Town of Franklin.

Another example is the Ipswich River. The headwaters of the river runs dry in most summers because the towns of Reading and Wilmington have wells that line the upper reaches of the river and intercept the water that would normally supply the river.

So we will need additional new sources of water to allow us to restore the impacts from some of our existing sources.

### Peak demands

Another complicating factor in our water future is the issue of peak demands.

The buildout future demands I have mentioned are average annual demands – that is averaging the low winter use with the high summer use. However, we need water supplies that are able to meet our peak demands – to supply the water we need on any given day or any given hour.



Water suppliers often struggle with meeting peak demands. In suburban areas, like much of the 495 region, summertime water use can be 2 or 3 times larger than winter demands. Almost all of these demands are caused by the water used for watering our lawns.

These summertime peak demands present the biggest challenge for our water suppliers.



They also present the biggest risk to the environment. These summertime uses occur just when our natural water cycle is at it's lowest. Large peak demands can make the environmental impacts I mentioned worse.

We will need to meet reasonable peak demands through new supplies and through efforts to reduce peak water levels.

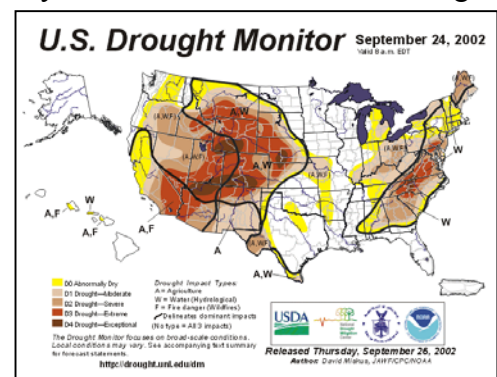
### Droughts

Finally, this past year showed us another issue facing our water supplies -- they must be able to sustain us through periods of droughts.

Since last October we are down 9 inches in normal precipitation. What was particularly troubling was that our driest months were during the winter – the time we normally refill our reservoirs and recharge our groundwater and get us ready for summer.

The only thing that prevented this summer from being a disaster for many communities is that we had a very wet May and early June. However, the rest of the summer was we returned to dry conditions.

While we cannot predict when droughts will occur, we can be certain that they will occur. We must build water systems and



we must be able to control our water demands so that we can get through droughts and do so with minimal impacts to the environment.

### Locating new supplies

Finally, the growth we are experiencing has another impact on our ability to meet future demands – it limits our options for finding new supplies. As development spreads across our land we lose areas that are suitable for new water supplies.

We are developing 44 acres a day of open space, or 16,000 acres per year. To the extent these are located in areas that could serve as future water supply we only make a sustainable water future that much harder to achieve.

### Long range vision

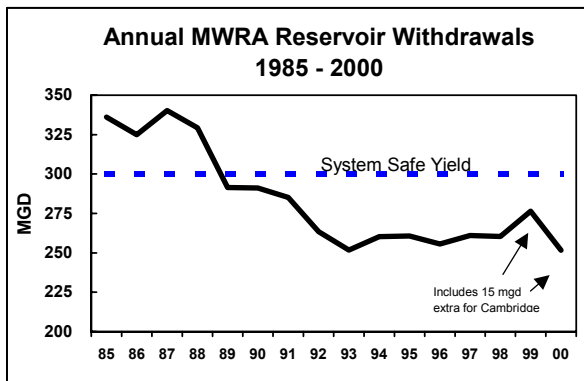
So what could be a vision of our future?

We need a combination of a long-term plan and immediate action. The water supply system that serves metro Boston is an example of the benefits that can result from this approach. In the Boston region we have the benefit of our grandparents generation's vision and the dividends of our own investments in water conservation.

During the first half of the 20<sup>th</sup> century the leaders in the Boston area had the vision to build the Wachusett and Quabbin reservoirs. These reservoirs can provide about 300 million gallons a day of remarkably clean, safe water. In addition MWRA communities protected whatever local sources they were already using, providing over 30 million gallons a day in additional water.

More recently, during the last decade, our own investments in leak detection and water conservation has ensured the viability of this system for years to come.

By the 1980s the MWRA system was over-extended. Demand was 330 million gallons a day, well above the 300 million gallon safe yield. While the first reaction was to try to divert the Connecticut River into the Quabbin, the long-term solution was water conservation.



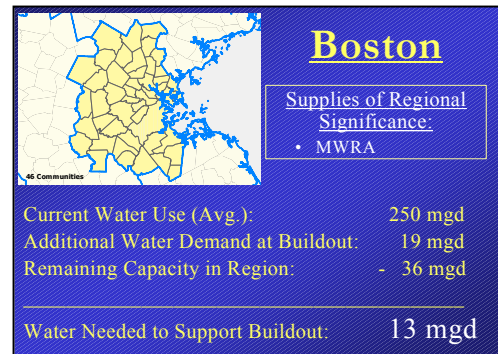
Through leak detection and other investments in infrastructure and water conservation the MWRA has reduced the average water use to 250 million gallons/day. The MWRA saved almost 80 million gallons a day, or almost 25%. These savings mean that MWRA system has enough water to more than meet the build out needs of their member communities.

Therefore, the future of the Boston region looks much different from the other regions of our state. They appear to have more water than they will need in the future. Exactly how much is still not clear.

Let me assure you, I am not recommending we flood towns in our state to build more reservoirs. But we can act with the same type of foresight and achieve similar results that will benefit our children and grandchildren.

#### Ensuring our Water Future

My vision of the future is one of water used efficiently that comes from protected local water supply systems, backed up by interconnections and access to other regional supplies and operated so as to protect environmental resources.



Local sources will be at the foundation of our water future. We cannot afford to lose any of our existing supplies given what we will need in the future. And we need to locate and protect the potential future supplies that exist but have not yet been developed. We cannot wait until we need them to protect them – by then it may be too late.

The water future in the Commonwealth must also include greater efficiency in how we use water and the use of modern technologies to manage our water systems in the most effective and environmentally sensitive manner. Using the water we already have more efficiently will be an important source for meeting future demands. Water conservation needs to be our first thought, not an afterthought.

And our future needs communities that take a holistic view to protecting the natural water cycle by looking at the entire water cycle and how they can build their community so as to protect this natural cycle – a cycle that is the life blood of our environment. Communities need to plan systems where their water supply, wastewater disposal, and stormwater management systems work together in a way that minimizes impacts to natural water resources. We can build and operate these systems so as to protect the water cycle that keeps our environment healthy.

For our water supplies a critical part of protecting the water cycle will be developing systems that work within a watershed context. A key piece of this will be to have interconnections between local water supply systems and access to regional supplies will provide backup capacity to local systems. These interconnections need to be within the same watersheds to help protect our natural water cycle and so we protect our natural water resources such as rivers, streams, lakes and ponds. These interconnections will be an important component for giving communities the flexibility to meet reasonable peak demands and to survive droughts without major impacts to the environment.

Potential regional back-up supplies will come from three primary sources. The first are existing water systems located in our older industrial towns – systems that were built for big industrial uses that no longer exist. Second will be any large, yet untapped groundwater sources -- aquifers that are large enough to be of regional significance. Finally, in some cases, the regional systems may also include access to desalinization plants that turn salt water to fresh water – though the cost of the water from these systems will likely limit their use and will help us to meet only a small part of our overall need.

However, while these systems may be able to supplement local supplies, the danger is that they will fuel growth that exceeds the carrying capacity of our lands and watersheds. Development can destroy habitat, increase nonpoint source pollution and create additional waste and wastewater that may not be

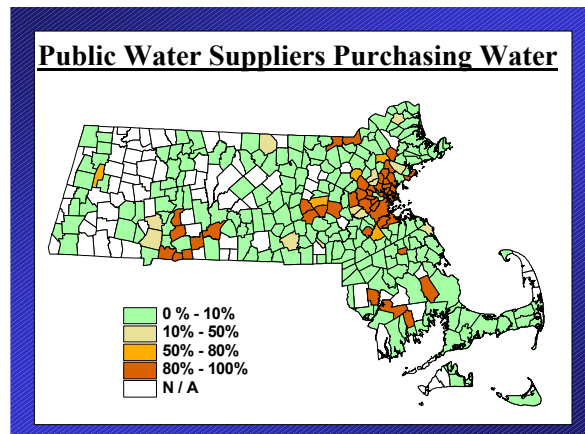
sustainable. Communities need to address growth management issues at the same time they are securing their water future.

One example of the importance of interconnections to regional supplies is from my hometown of Marlborough. This summer Marlborough was able to use MWRA water to meet all its water needs early this summer when the reservoir dropped to dangerous low levels because of the drought. All communities should have this sense of security.

Interconnections and regional supplies are not new to Massachusetts. Across the state communities sell water to each other when they have found it to be in their mutual self-interest.

How will this vision play out? Let me use the Southeast region as an example of how this vision could look if we take advantage of the opportunities we have.

Southeast Massachusetts has all the ingredients for a sustainable water future or for a disastrous one, depending on what we do. On the one hand the buildout water deficit in this region is an incredible 114 million gpd, exceeding the entire MWRA surplus. Sprawl is coming from two directions, both south from Boston and north from Providence. Without a long-range vision many communities may find their future development constrained and their environment impacted by a lack of local water sources.



On the other hand, the area is rich both in surface water and groundwater resources. Communities need to undertake comprehensive evaluations to identify environmentally sound sources. They also need to take steps to protect these local sources before they are lost to development.

In addition to a strong base of local sources, the region also has several potential supplies of regional significance that could provide a critical back-up to these local supplies. These include:

The old urban surface water systems. New Bedford may be able to draw on 7-9 million gpd of unused capacity in the Assawompset system in Lakeville. Fall River has about 2 mgd of water available beyond their needs in the North Watuppa Pond, and could have 5-10 million gpd of extra capacity on the South Watuppa. The challenge is to keep these supplies protected so they can serve as water banks for the future.

The Plymouth-Carver aquifer. This aquifer is the largest high-yield aquifer in the Commonwealth and much of the land above it remains undeveloped. The challenge is to balance the potential of these water resources against the environmental impact of substantial withdrawals. For example, a USGS study estimated that the Plymouth-Carver aquifer could generate 18 million gpd of fresh water, but not without environmental consequences. Of course, all the fresh water ponds in the areas would then drop by five feet, impacting the biodiversity and ecology of the ponds. What should be the appropriate balance?

The ocean. A desalinization plant is supposed to be delivering several million gpd of drinkable water to Brockton by July 2004. The plant can be expanded to 20 million gpd. The water source is renewable, but the costs associated with this water (because of the energy demands associated with this technology) may limit its use.

The vision I have for this region is one where communities continue to protect and use their own sources to meet most of their water demands and make investments in water efficiency. But they also have the ability to access these larger reservoirs or natural water reserves to back-up their supplies, reduce the environmental impacts and to help them withstand droughts. This approach can work across the Commonwealth. With foresight and planning now, these communities can secure their water future.

#### How will we achieve this vision?

There are three key steps we need to implement a long-range water vision.

These three steps are:

- Preserve what we have
- Identify and protect what we need
- Balance our water budget

Let me outline each:

#### Preserve what we have

We must preserve the local sources we have so they can continue to provide high quality, safe drinking water. We must protect the land around our water supply sources and other water resources and implement zoning controls to avoid locating incompatible uses near our water supplies.

Preserving what we have also means using water more efficiently. Most communities can save 15-30% of their water through water conservation efforts. In addition to the MWRA, we have examples like the program in the Town of Weymouth where the town is helping homeowners retrofit water-wasting toilets with water saving ones through a town run program.

Finally, preserving what we have means maintaining the investments we have made in our water systems. Nothing is more important than a water system that provides safe, clean water every day. This only happens if we are willing to make the investments that are needed to maintain and improve these systems.

The second step is:

#### Identify and protect what we need

The time is now to find our remaining environmentally sound water sources before they are lost to development or contamination.

As the next step in our Community Preservation Initiative we are working to help communities take this step. Just as the buildouts helped communities understand land use changes and water needs, we are undertaking a “**Water Assets**” project to provide every community with information about where future water supplies may exist. We hope this information will help them confirm areas suitable for water supply development and will encourage communities to protect them, whether they need them now or in 20 years.

This analysis looks at areas that may be suitable for development by eliminating unsuitable areas.

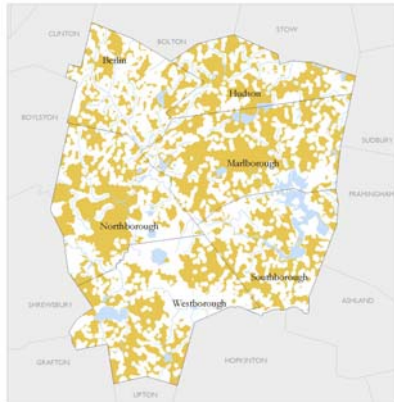
The first map shows the study area. (The yellow area will start shrinking as areas unsuitable for water supply are removed).



The next map then removes the protected resource areas of state and federal open space and wetlands and their buffers – areas generally not available for water supply development.

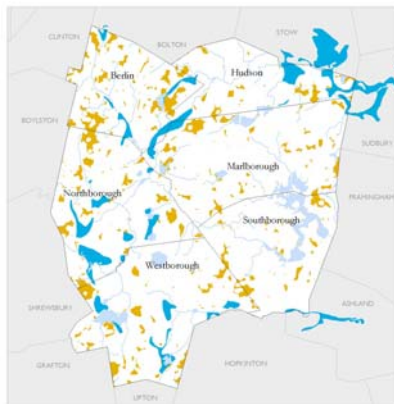
The next map removes any areas located within 400 feet of an existing development – 400 feet being the buffer needed for a new water supply. The dark blue areas are the areas of high and medium yield aquifers – the areas most likely to have water in sufficient quantity for development.

Not all towns will have as few options as these towns appear to have. The information should help them investigate these areas and protect those that can serve as future supplies.



But we must not only look locally, but also statewide. We have some information on where high and medium yield aquifers -- that is, areas where we know that good underground water exists (usually sand and gravel area that are good at holding water) – are located. We are working to improve this information.

Areas like the Plymouth Carver aquifer stand out as our biggest potential supplies. These areas can help meet the future water needs of not only the communities in which they exist, but of the surrounding region as well.



By working with local water suppliers and communities across the state we hope to be able to build an accurate picture -- much as we did with the BioMap-- of where our best future sources are and to then use this information in local and state conservation planning and programs.

The third step is:

#### Balance our water budget

Securing our state's water supply future will be a failure if it is at the expense of our environment and the natural biodiversity of the state. Balancing the water budget isn't about green dollars, but

about protecting our green environment.

We need to ensure that our communities and our water systems can be operated so as to minimize impacts to local water resources such as rivers, streams, lakes, ponds and wetlands. We also need to be able to restore those areas where our worst existing impacts already occur.

Part of this is to provide improved protection for our rivers and streams. These ecosystems depend on the natural variation of flows through the year – high flows in spring and fall and sufficient water during the summer to provide cool water and deep-water habitats. By using the knowledge we have gained through recent streamflow studies we can develop a comprehensive streamflow policy. This policy can do for the water in our rivers and streams what the rivers protection act did for the shoreline – ensure there are protections to buffer these critical resources from impacts.

Balancing our water budget will also mean having the ability to reduce our peak water demands. We cannot expect to be able to use the same amount of water during times of drought.

Finally, our water budget must be balanced by looking at everything we do that affects the water budget. We must focus on keeping our water local.

Smaller, decentralized treatment plants that discharge water back to the ground.

Stormwater systems that capture the runoff from roofs, driveways and parking lots and recharges it into the ground rather than piping it to the nearest stream.

For example, the Charles River Watershed Association is developing a cistern system that captures water and recharges directly to the ground. We need to actively look at these innovative approaches at the local and state level.

And we must find ways to reduce impervious surfaces that keep rain from recharging our groundwater. Cluster developments and other green development techniques can help control impacts from impervious surfaces.

By taking these three steps:

- Preserving what we have
- Identifying and protecting what we need; and
- Balancing our water budget,



We can provide a future for our children that are both economically and environmentally bright.

So let me end by giving you my top ten of how we secure our water future.

- 10) Within 10 years identify and protect the water supplies needed for the future in eastern Massachusetts.
- 9) Within 15 years identify and protect the future water supplies for the rest of the state.
- 8) Within 10 years communities should save at least 15% of their current water demand through conservation and leak detection programs
- 7) Within 2 years develop a statewide streamflow policy that protects these critical environmental resources and provides a predictable permit process for municipalities
- 6) Continue to focus state and local land acquisition programs on protecting existing and future water supplies.
- 5) Immediately work to expand the state revolving loan fund to provide a new source of land acquisition funds to communities.

- 4) Consider expanding the bottle bill to include bottle water – and use the unreturned deposits to fund local water conservation grants and state water resources programs, much as we support recycling efforts.
- 3) Deliver the results of our water assets program to every community within the next 18 months.
- 2) Help communities complete local plans that use the BioMap and Water Assets project to protect the green infrastructure and balance the water budget of the community and the watershed.

And, my number one recommendation for securing our water future: (drum roll please)

- 1) Inspire every citizen to take responsibility for their environment and their water use. It is only through a personal understanding of how each of our actions affects the larger picture that we will be able to build a water future that will provide a great legacy for the future.

Water resources are a critical component of our environmental and economic future. We need to begin ensuring that we will have a water rich future that sustains both. Thank you.